


RARE
BOOK
CABINET

HASKELL'S MANUAL OF PLATE WORK

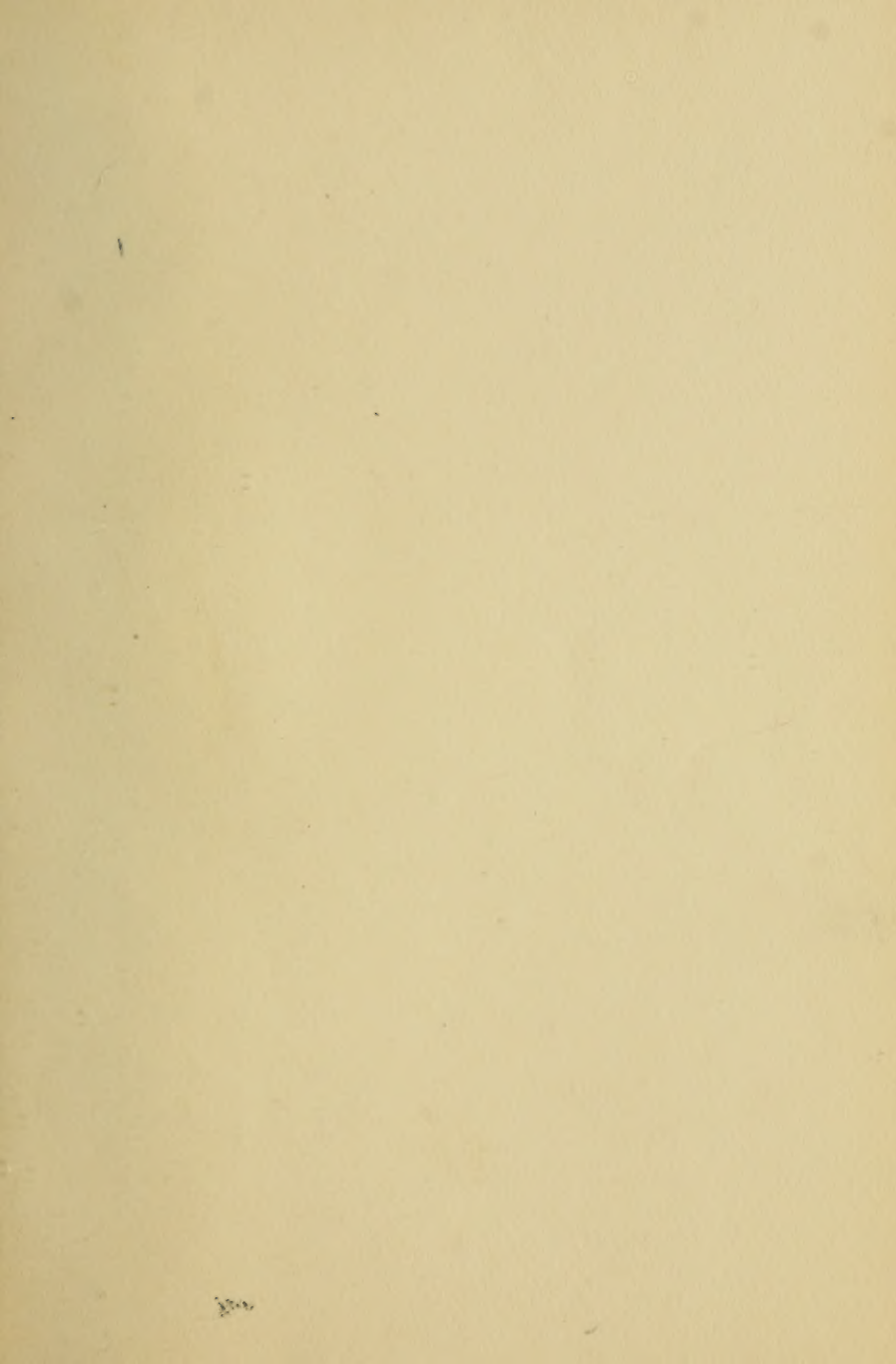
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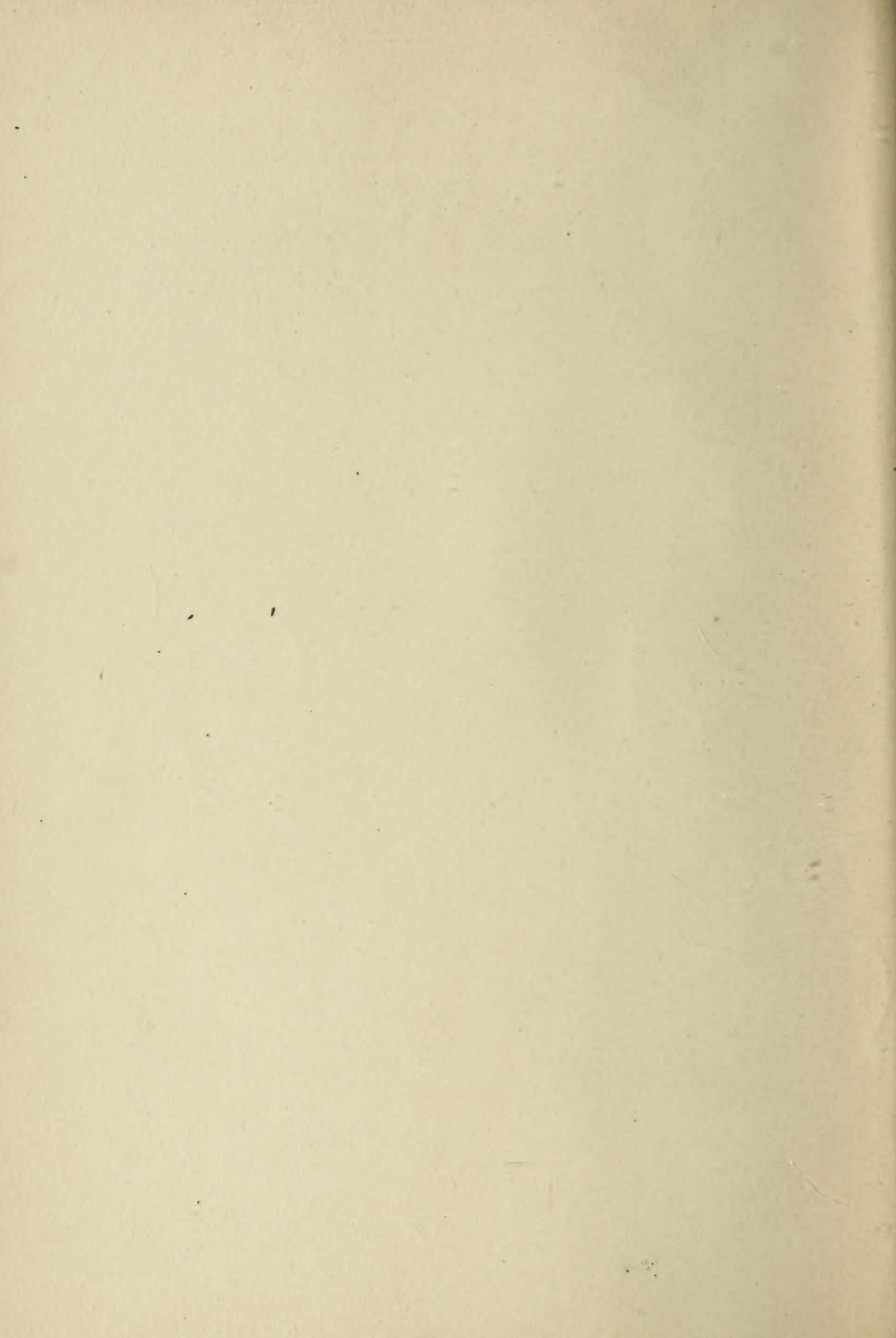
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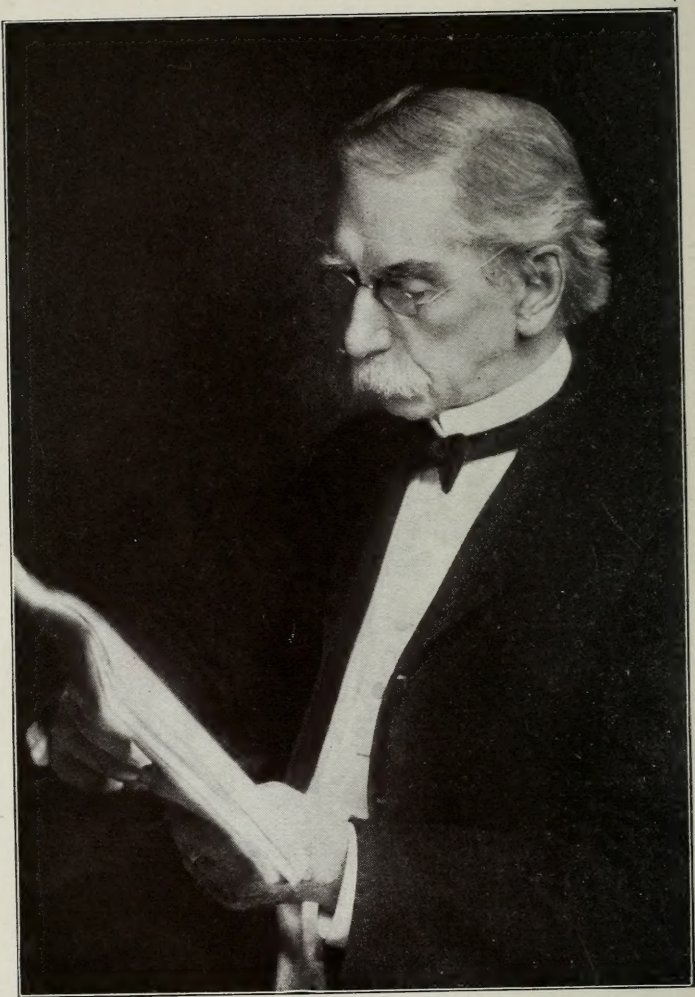




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LOOMIS P. HASKELL.

Haskell's Manual *of* Plate Work

OR

Hand-Book for the Dental Laboratory

BY

LOOMIS P. HASKELL, D. D. S.

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REVISED EDITION

The Only Work Devoted to Plate Work Ever Published

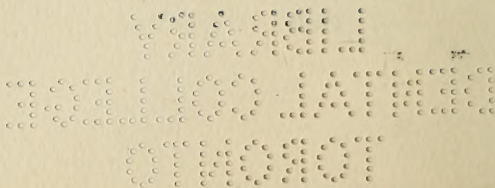
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1910

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INTRODUCTION.

My twenty years' experience of instruction in the Haskell Post-Graduate Dental School has led me to issue a revised edition of the "Students' Manual."

Having students who were graduates of nearly all the more than fifty dental colleges of this country, I have found that not more than ten per cent of them, some of whom have been in practice twenty-five years, have ever put in the mouth a set of teeth on a metal plate. The principal reason for this was that upon entering into practice they had not confidence in themselves to recommend such a denture for fear they would not make a success of the work, and as the making of a vulcanite plate is so simple they used that system. In fact the making of metal plates is a lost art in a large majority of dental offices.

Previous to the introduction of vulcanite into dental practice, nearly fifty years ago, artificial teeth were inserted upon metal plates, gold, platinum and silver, and all soldered work. A high degree of skill had been attained, of course involving much labor and time, especially in mounting full sets of single gum teeth, banding the plate, backing, soldering and finishing, with tools and appliances far less applicable than those in use today, the soldering being done with mouth blow-pipe, and often an alcohol lamp.

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Upon the introduction of vulcanite, so much more simple, the metal plate method was gradually abandoned, until at last the new men coming into practice, to a great extent, were not even familiar with the old methods.

While vulcanite has its place and could not be dispensed with, there is one very serious objection to it, and that is, as a vegetable base, its non-conductibility, resulting in retention of undue heat and undue absorption of alveolar process, continues in at least eighty per cent of mouths, so that there are thousands of upper jaws flat and ridgeless. This being the case, vulcanite should not be recommended to the patient for permanent full upper dentures.

These are my reasons for again placing before the profession, especially the rapidly increasing number of new men, who need, in condensed form, simple and explicit methods, the result of sixty-five years' exclusive experience in plate work.

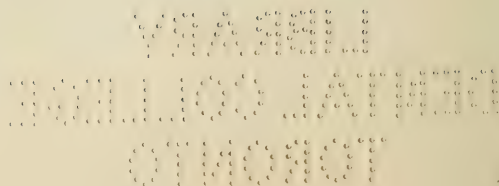


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YAGEL
JAMES J. YAGEL
OTHOSE

Haskell's Manual of Plate Work



THE LABORATORY

Should be a fair-sized room, and well lighted; if possible supplied with hot as well as cold water, gas, and electricity. The following list of tools and appliances are needed. Shears, flat-nosed pliers, round-nosed pliers, side-cutting pliers, plate nippers, plate punch, loop punch for aluminum, half-round six inch files, Nos. 2 and 3, with handles, small round file, plate burnisher, flat riveting hammer, horn mallet, with long end cut off to $\frac{3}{4}$ inch diameter and filed round, automatic blow-pipe with bellows, unless compressed air is at hand, carbon solder block with handle, borax slab, solder pliers, swaging block, on cylinder stand that can be kept under the bench, good sized hammer, moulding ring 5 inches in diameter, $2\frac{1}{2}$ inches deep, Bailey flask for counter die, Chase moulding sand, small potato masher for packing sand, acid dish, made of sheet-lead, shaped over bottom of melting ladle with horn mallet, flat-bottomed melting ladle, plaster bowl, table knife, instead of spatula, teaspoon

for mixing plaster, knife for cutting plaster, wide-mouthed bottle for shellac, bottle for oil, stiff brushes for both, lathe and appliances, including sand paper chuck.

For Vulcanite Work.—Vulcanizer, flasks, spring-clamp, so as not to need bolts, press, file, chisel, square end. Scrapers are not needed if lathe has sandpaper chuck, as it does the work better and quicker. In case one has the electric current the electric lathe is of great advantage.

PREPARATION OF THE MOUTH.

As a rule where a number of teeth remain in good condition bridge-work is the best method of replacing lost teeth. There are cases, however, when a gold plate, properly fitted, with nicely adjusted clasps, would be preferable.

But often the matter of expense will not admit of the bridge. Here comes in the matter of the retention or extraction of certain teeth. This resolves itself simply into the question of what shall be done to make the artificial denture most useful and comfortable. If the extraction of these will accomplish this, by all means extract.

It is unwise to allow the cuspid teeth to remain as the openings in the plate, resulting therefrom, make a weak and soon breaking denture, besides not so easily retained as a full denture. The retention of one or two molars is undesirable.

On the lower jaw the retention of the cuspids is desirable as anchorages for the plate. It is unwise

to crown them because sooner or later the gums settle, leaving the cuspids too long, the only teeth to meet the upper teeth, and must be shortened.

TEMPORARY SETS.

As a rule it is better to insert a temporary set immediately upon extraction of the teeth, for several reasons, the first being that the gums will not be as sore as if deferred for several weeks. Then if the remains of the anterior teeth are removed the new teeth may be set into the openings a little distance, giving a more natural appearance.

The bone, as a rule, is not in a permanent condition in less than a year.

The temporary plate can be retained better with an air chamber.

RETENTION OF UPPER DENTURES.

To begin with, vacuum cavities are not needed, no matter what the condition of the jaws.

Every dentist knows that the center of the palate is hard, but few seem to consider that it is the only portion of the upper jaw which does not change, whereas the ridge does change, under vulcanite extensively, to some extent under metal. Unless provision is made for this change it is only a question of time when the plate is resting and rocking over the hard center.

To provide against this make a "relief" of thin sheet wax, extending near to top of anterior ridge

and back to within one quarter-inch of the back of the plate, and plates can be worn farther back than usually worn, about on a line with the base of the tuberosities. The "relief" may average about one-half inch in width, with undefined margins.

IMPRESSION.

The impression for a full denture should be in plaster, tray not too large. If margin is not high, place wax over the outside of cuspid eminence, so as to carry impression high, and also over tuberosities, if prominent. Press up the rear first so as to force excess forward. If the patients nauseate tell them to resist it, using will power. If it be found there is excessive nausea, so the impression is not a success, apply cocaine on cotton held in pliers to rear of palate. In upper impressions stand behind the patient, in lower stand in front.

In partial sets do not take first in wax or modeling compound, because there will be portions of the plaster so thin the pieces cannot be replaced.

TO FILL IMPRESSION.

Shellac, used thin so as to leave no film. With stiff brush apply soap suds, washing out excess before filling. Apply the plaster in the ridge opening, forcing it around to the heel so as to drive out any water, jarring with spatula.

TO PREPARE THE MODEL.

Upon removing the model by cutting away the impression and prying off piecemeal, oil a glass slab,

pile up some plaster upon it and press the model down until it is about one inch thick at the heel. With spatula slope sides all around, as this will allow the model to drop from the mould, never to be lifted out. If there is some undercut raise the model in front higher than the heel, and give more slope to the heel, and it will drop readily from the mould. If it should not, just jar the edge of flask on the edge of the moulding box.

In case of excessive undercut, make a core. After model has been prepared and shellacked, oil the surface as far as undercut extends, set it on the slab, mix plaster and asbestos, equal parts, and apply to the surface, high as the ridge, half-inch thick, thinner at top than base, and bevel the sides. Dry till no moisture remains, mould the core and model together. As both drop out, replace core and pour the metal. This is seldom needed.

DIE AND COUNTER DIE.

Dies.

A proper die should have the following essential qualities: Non-shrinking; hard, so as not to batter; tough, so as not to break; smooth, and melt at low temperature; the latter so as to use with oiled sand.

Babbitt metal has all of these qualities. The ordinary Babbitt, as used for machinery, often contains some lead which ruins it for dental dies.

A proper Babbitt is 1 part copper, 2 parts antimony, 8 parts tin. It can be had at all leading dental depots.

Counter Dies.

It is difficult to pour pure lead upon Babbitt, as it melts at a higher temperature. Reduce the melting temperature by the addition of one part tin to five parts lead.

A moulding box 18 inches square and 6 inches deep is needed.

Oiled sand is preferable to water as it is always ready for use. The Chase moulding sand, for sale at all dental supply houses, is oiled.

A moulding ring 5 inches in diameter and $2\frac{1}{2}$ inches deep gives room for packing, as the Bailey flask is too small. No sifting is needed. A small potato masher, with knob sawed off, is a good tamper, using handle to pack around the sides. Pack hard. Some unwisely advise otherwise. Pour the metal as soon as melted in one corner (do not overheat). When hard, lift out on a box cover, scrape off the sand, and throw into the water. Wipe dry and coat with moist whiting. Dry and replace in the sand right side up and pack the sand to just above where margin of plate would be. Set the Bailey flask over it. Do not pour the counter die metal as hot as it comes from the heater, but stir until it begins to crystallize, and pour quickly. Do not fill the flask full, but leave a half-inch margin to handle by the use of old forceps or large pliers. Scrape off the sand, and throw into the water. Separate by striking the heel of the die. Wash, dry, and oil them.

SWAGING PLATES.

A pattern should be made for the gold. The Japan tea chest lining is an excellent material for the purpose.

Twenty karat gold, gauge 28, is preferable. The plate should be annealed to a dull red heat and dipped in sulphuric acid, equal parts water, in lead acid dish as previously described. Begin swaging at the heel with horn mallet over the tuberosities, holding the plate firmly at the sides between the thumb and forefinger, middle finger against the die to hold it firm, next driving up thoroughly in the palate, after which cut a slit in the front, from margin to top of the ridge, for two reasons. This is the weakest portion of the plate, often breaking through the median line. By cutting, lapping, and after swaging, soldering, it is strengthened 100 per cent. Then again if there is much undercut, time and labor are saved. After slitting, drive up around the margins with mallet, occasionally swaging till fully swaged. To solder, pry well open the slit and apply plenty of wet borax and swage. Slip over the parts small wire clamp, apply the solder on the **inside** and the heat on the outside, when soldered clean in acid.

The horn mallet as it comes from the factory is worthless. The long pointed end is of no use and the large end is too large. Saw off the long end where it is three-quarters of an inch in diameter and round with the rubber file. When partly swedged, wipe with a cloth the oil, which has protected the plate from the adhesion of base metal and anneal again.

Wire clamp is made of iron wire about gauge 18, one inch long, the ends flattened, bend double with flat-nosed pliers, leaving loop at the double.

In trimming the plate, remember it should be worn all around high as possible and always highest over the cuspid eminence. To determine just where to locate these high points one should have an idea about the size of teeth needed for any given case, and taking a pair of compasses, measure from median line to the middle of the cuspid tooth. Transfer this measure to the die, each side, and transfer to the plate. The plate should drop suddenly just back of the high point to give free play to the muscles. Trim from the right heel all around, holding the plate right side up, using the points of the shears, as it is easier to cut around a curve with straight shears than curved, if the points are used. File neatly and if the frenum is attached quite low file a notch part way.

Try the plate in the mouth to see if fit is correct, and if it is not too high anywhere. Wet the palatal surface, place in the mouth and with a pumping motion in center of plate watch for air bubbles at the center of heel. If so, scrape the model at that point and burnish down until no bubbles appear when again tested.

WIRING THE PLATE.

This is simple and easy if approached right. Use 18 gauge gold wire, to be annealed. The first object is to attach the wire at some point, and the most convenient is along the right side, not at the end. Fit the wire, with plate on the model or die, about an inch; fasten with two wire clamps made of small iron wire, the ends flattened. Wire bent nearly double, half-inch long. Do not rest the plate on the clamps, but allow them to hang over the side of the solder block. Apply borax and solder, and just flow it so as to fasten. Then fit the wire with the pliers, with plate on the model, to the median line, clamp and solder fully and so continue, finally soldering the ends around the curve. File the margin to a finish, leaving the inner edge round. To attach the vulcanite, solder loops of German silver to the ridge, as the wire, if too much solder has not been used, will afford a hold on the margin. The loop punch can also be used instead.

TAKING THE BITE.

Two objects are to be had in view in taking the bite: To get the relative position of the jaws, and the impression of the lower teeth if there are any. Warm a roll of wax, pure yellow, free from paraffine, and fasten firmly to the plate. Place a bit of wax at the posterior margin of the plate and tell the patient to touch it with the tongue, and while it is there close the jaws, watching to see if the tongue remains turned back. It will be found difficult to

move the jaw forward or sideways while the tongue is in that position.

Place the plate and bite in an articulator, to be used only as a partial guide at the bench, as teeth should be arranged by the mouth, as it is impossible to tell when they are correct in appearance only as seen in the mouth. Not only this, but the patients should see them, so if they insist upon some change it can be made at this time.

SELECTION AND ARRANGEMENT OF TEETH.

In no department of dental practice is more skill, judgment, and experience needed than in this; and in none is there so little manifest, if we judge from the average artificial dentures in wear, especially full sets.

Dr. W. W. Allport, of Chicago, well expressed it in an address before the Boston Academy of Dental Science:

“He who has but moderate ideas of symmetry, harmony of expression, and color, is constantly pained by the lack of that artistic selection and arrangement of artificial teeth which serve to restore to the face the shape and expression left on it by the Creator, the absence of which in artificial dentures stamps him, who should be an artist, an **artisan**, as a mere mechanic—a libeler of the soul—a deformer of the human face divine. That mechanical dentistry should have very largely fallen into the hands of this inferior class of practitioners,

will hardly be wondered at by those who have watched the history of this branch of the practice. For so simple are the modes of attaining tolerable mechanical results, with the methods now usually employed in this department, by the use of rubber plates and 'gum sections,' that one possessing a high order of appropriate talent is seldom found devoting much time to it."

It is difficult to give oral or written instruction on this subject; it requires the clinic, often repeated. As the dentist is constantly at work upon the natural teeth, he should study the subject from that standpoint.

The indiscriminate use of "gum sections" is largely responsible for many failures, for it is impossible to secure proper results, in all respects, where they are used. Their arrangement is arbitrary, too often cannot be ground thin enough. The gum is too low between the teeth.

I long ago ceased to use them, using instead, plain teeth and pink rubber gums. The question is asked by dentists: "Suppose your patient says she wants a more natural-looking gum?" I tell her it is better to sacrifice somewhat on the **color** of the gum than so much in other respects, by the use of gum teeth. I never yet have had to change the teeth in such cases.

Arrange the teeth and a wax gum, and tell the patient that the wax will be replaced with a gum, but do not say what kind, and they seldom speak of it afterwards.

If there is prominence of the upper jaw and short lip, the worst class of cases to deal with, the gum teeth are utterly out of place, because while a **porcelain** gum is a necessity, it must be very **thin, high, and seamless**. In these, the Continuous-gum process is the only available one, as by it a thin gum can be secured and yet be strong, because it is baked to the plate. If the patient cannot afford the Continuous-gum Work set plain teeth flush with the gums and not extend plate outside in front.

In selecting teeth, if there are teeth remaining in the jaw, there is little difficulty, because it is only necessary to match these natural teeth.

In the selection of teeth for full upper sets, the lower are usually a guide in color and size. I say in size, in this way: the upper teeth, when properly articulated, should be so arranged that the cusp of the lower cuspid is between the upper lateral and cuspid; so that the upper teeth which do this, it may safely be assumed, are the size of the natural ones. This allows of the interlocking of the bicuspids, as in nature. If, in the preparation of the mouth, there should be extracted the central incisor, be sure to retain it as a guide in the selection of artificial teeth. The patient will sometimes insist that you have selected teeth larger than the natural. I have often in this way shown patients that I have selected teeth no larger, and sometimes a trifle narrower, when they have supposed their new teeth were larger.

There is a great tendency to use **small** and **white**

teeth, which often give an insignificant expression to the mouth, the patient looking as though wearing their deciduous teeth. I sometimes remind them that it is time they had shed their "baby" teeth.

The dentist must be guided by the general appearance of the natural teeth. The study of physiognomy and temperament is of great value in deciding what to do when **all** the natural teeth are missing. As a guide, I have prepared the following table, abbreviated from the elaborate one of Dr. J. Foster Flagg's, which will be found serviceable. Of course, there are variations from these, as there are combinations of temperament.

All teeth are variably yellow at the neck (some very slightly). They become darker from the cuspids to the posterior. The cuspids are always more yellow than the incisors, and the bicuspid and molars darker still.

This rule, however, is not followed by the manufacturers, but the dentist, in matching partial sets, at least, should see that the **posterior** teeth are the **darker**. Usually, there is more yellow in the lower than in the upper teeth.

It is not, however, always possible to secure just the shade required from the stock to which you have access; neither is it the case in the large stocks. This is partly because so many dentists are indifferent, or do not know what is proper. If dentists had more cultivated tastes and were more particular, so as to make an imperative demand for better

	Billous.	Sanguineous.	Nervous.	Lymphatic.
	Tall, angular, Square-built.	Full, firmly Rounded, Robust.	Delicate, Slightly built.	Bulky, clumsy.
Cranial Contour...	Angular, high cheek bones.	Rounded and Full.	Oval.	Flat-faced.
Hair	Black and curling.	Golden to light chestnut.	Brown, wavy, fine.	Coarse, straight, drab.
Eyes	Black.	Blue.	Dark brown.	Gray.
Lips	Large, Brownish, Purple.	Ruddy and full.	Fine, grayish pink.	Large, not shapely.
Teeth, Shape	Large, longer than wide, Angular.	Well propor- tioned, curved and rounded.	Long, almond-shaped.	Large, width predomi- nating.
Teeth, Color	Brownish, Yellow, Opaque.	Straw, yellow, translucent.	Pearl-blue, translucent.	Dark gray, opaque.

shaded and shaped teeth, they would speedily be made.

There are certain general directions that may be given for the **arrangement** of the teeth.

Be careful not to make the teeth **too short**. This is a very common failure, patients often appearing as though they had no teeth. Remember that when the teeth have been extracted many years, and too short teeth have been worn, the muscles contract, consequently make the teeth longer than you otherwise would, as the muscles will lengthen again.

Always arrange the upper teeth first, in **full** sets, as they give character to the face. Arrange the anterior teeth and bicuspid's so that if placed upon a flat surface they will rest evenly; arrange the molars shorter and on an oblique line. The lower teeth arranged to these, will show, upon a flat surface, only the incisors and second molars touching. This arrangement is, of course, nature's, and will effectually prevent the lower denture sliding forward, as is sometimes the case.

In all cases where the cuspids have been missing for a year there is absolute necessity for the plate to be higher, and the gum fuller, than elsewhere, so as to restore the contour of the lip, two to three times thicker than over the centrals.

If the upper lip is short, the natural teeth show much more than when it is long. Some persons can scarcely cover the natural teeth; they often show the whole length of teeth and much of the gums. If the upper lip is very long, the natural teeth do not show at all.

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The lower teeth do not generally show as much as the upper; seldom are the gums seen.

Rarely allow a **drawn-in** appearance to the upper teeth. It sometimes occurs in the natural organs, but is usually a deformity, like some other irregularities, not to be followed. The teeth, as a rule, should stand perpendicular, avoiding either an inward or outward slant. Of the six front teeth, the cuspids should generally be the most prominent, especially at the neck. The bicuspid should drop inside a trifle of the range of the cuspids, and from there back be nearly on a straight line.

There are various irregularities of the natural teeth; such as over or under-lapping of the laterals and centrals. If it is a pointed jaw, and the lower teeth are contracted, the centrals should be the most prominent, and the laterals **dropping back** a little, and the cuspids still more.

If the arch is broad, the laterals should overlap, if not in a line with the centrals. We should set the teeth apart in some mouths where there is plenty of room, and close or even lapping when there is a small arch, and in some mouths make the teeth quite irregular, if it is a person of large build, especially if his lower teeth are crowded and irregular.

Never consider it necessary to make the teeth absolutely ugly to look natural.

For a lady of regular features, irregularities, except slight ones, are to be avoided. Nothing more than the setting apart of centrals, or slight tipping of a lateral, is needed.

Where both sets are being inserted, they should always be arranged together.

In the arrangement of the lower, teeth, after the length is decided on, the width of the six anterior teeth should be such as to bring them within the proper compass for a correct articulation; that is, so the **point** of the **lower cuspid** comes between the upper lateral and cuspid. Then there is no difficulty in securing a correct apposition of the bicuspid and molars. In arranging the lower teeth begin with the bicuspid, as it is very common to find the lower fronts in full sets are too wide for the uppers, and narrower ones must be selected.

Of all places, gum sections are most out of place on the lower jaw. The necessity of setting the teeth sufficiently in over the ridge makes it generally impossible to get them there without grinding away the gum too much; with them it is next to impossible to give the proper arrangement of the teeth, so as to secure a correct expression and articulation. If gum sections are used on the upper jaw, they should at least be discarded on the lower.

The utmost stress must be laid on the correct closure of the teeth. **There are more failures arising from faulty occlusion than from misfits.** The jaws should close so as not to disturb the position of the plates, otherwise there is trouble.

A common fault is the interference of the anterior teeth. When they strike before the posterior teeth do, the upper plate is crowded forward and down from the rear.

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The six anterior should never meet, except where mentioned later. When, as is usually the case, the upper close outside the lower, they should drop not more than $\frac{1}{8}$ inch below the ends of the lower, and there should be at least $\frac{1}{8}$ inch space horizontal between them, and even then, in time, by the settling of the gums, they will come together, and need grinding to prevent strong pressure.

If it is a protruding lower jaw, let the upper teeth be arranged over the ends, but not meeting; the back teeth being long enough to take the pressure off the front teeth. In excessive prominence of the lower teeth, arrange the upper teeth inside of the lower, as nature had done; then if they do meet slightly, the pressure will be favorable to the upper.

The posterior upper teeth should never be allowed to drop on an inclined plane from the cuspid to the molar. The expression is bad, and the possible advantage claimed by some in use is not sufficient compensation.

The manner in which the **surfaces** of the bicuspid meet is of importance. The **posterior** slope of the lower bicuspid should press on the **anterior** slope of the upper. The lower anterior teeth should be set well in over the ridge, otherwise there is undue prominence of the lower lip.

The pressure should fall mainly on the bicuspid and first molars, not allowing the second molars to meet, because when there shall be a closer ap-

proximation of the teeth

the pressure will be

proximation of the jaws by the settling of the gums, these teeth will feel the pressure excessively, and there will be irritation of the membrane and crowding forward of the plates; this will be felt specially on the **lower** jaw, and require shortening of these molars.

If there are wisdom teeth standing alone on the lower jaw, they are usually inclined forward, so the surface is often at an angle of 45° . They should be avoided in arranging the upper teeth, for if they meet it will result in crowding the plate forward, and the difficulty will constantly increase.

A difficult condition of things is met when a full upper set is inserted, and there remains on the lower jaw the six anterior teeth, and on one side one, or perhaps two bicuspid, and nothing on the other. There is nothing on the other side to counterbalance the pressure on these bicuspid. The insertion of partial lower on the other side would be of no value, for they would soon yield to pressure; but, if these bicuspid were extracted, and on both sides were artificial teeth, the difficulty would be removed; the patient would have a good masticating surface, and no displacement of the upper plate. In such instances the best interests of the patient should be consulted, and not mere sentiment about extracting sound teeth. Equal pressure is required.

If **all** the teeth remain on one side and none on the other, make a virtue of necessity, as there is so much involved in the sacrifice. Build a biting surface for the lower cuspid; if it is a rubber plate, in-

sert a small piece of a tooth, with the pins in it, in the rubber, back of the upper cuspid.

The articulation of teeth is sometimes very difficult. Great care must be exercised that there is no one tooth nor one side meeting before the other.

When the lower anterior teeth are much longer than the bicuspid, shortening of them is always desirable, or sometimes building up these bicuspid or placing crowns on them is essential. If this is not done, make the upper bicuspid sufficiently long to throw the jaws apart, so that the upper will not close too far below the ends of the lower. They should drop not more than $\frac{1}{8}$ inch below the ends of the lower, and there should be at least $\frac{1}{8}$ inch space horizontal between them. If the surfaces of the bicuspid are **inclined planes**, from lingual to buccal surface, grind, if possible, so as to make a square biting surface, or else crown.

The general position of the lower posterior teeth should be such that the force of the pressure is toward the center of the upper ridge, and not outward. It is usually more difficult to properly arrange the lower set than the upper.

The two sets should always be arranged together, then finish one and try in, and correct any faults arising from the two sets in wax arranged at once.

In ninety-five per cent of mouths there is more depression at the left side in the region of the cuspid than at the right, so that the teeth need to

be extended lower from the plate, to secure a proper range with the lips; and also more thickening of the artificial gum, to restore the contour of the lip.

"Some years since, Dr. W. G. A. Bonwill read a paper before the Odontological Society of Pennsylvania, in which he made the following claims:

"That the lower human jaw forms an equilateral triangle, the base of which is the distance from center to center of the condyles, and the sides the distance from these points to the median line of the inferior incisors, the average measurement of the sides of the triangle being about four inches.

"That in ninety-five per cent of cases the superior jaw projects beyond the inferior, the depth of the underbite varying from three-eighths to one-sixteenth of an inch, and that in not more than five per cent of articulations do the incisors come directly together.

"That ramus has a definite curvature, and that the depth of the underbite and the length of the cusps of the bicuspid and molars correspond therewith.

"That the teeth in the arch posterior to the cuspid are almost directly in a straight line toward the center of the condyles.

"The substantial correctness of these conclusions appears probable.

"The centers of the tips of the anterior superior teeth are in the arc of a circle, the radius of which is found by measuring from between the centrals

along the median line of the mouth a distance equal to the combined widths of the superior central, lateral, and cuspid, taken at the lines of greatest breadth. A line, at right angles to the median line of the head, through the center of this circle, which is known as the circle of the mouth, will pass through the centers of the second bicuspid; and a similar line, parallel to the first, through the posterior periphery of the circle, will pass through the posterior edges of the second molars.

“The cuspid and the anterior buccal cusp of the first molar, it will be remembered, have been previously spoken of as forming respectively the primary and secondary springs of the superior arch; that is, they mark decided changes in its direction. The superior central, lateral, and cuspid, as has been said, lie in the arc of the circle of the mouth. At the cuspid the direction changes; the buccal faces of the teeth between the cuspid and the anterior buccal cusp of the first molar lie in a straight line. At this latter point, which is usually prominent, the arch is again deflected slightly upward.

“In the inferior jaw there is no secondary spring of the arch. The four incisors are more nearly in a straight line than their corresponding teeth in the superior jaw. The direction changes sharply at the cuspid, and thence forms a continuous, gentle curve along the buccal faces of the teeth, though the lingual faces of the posterior teeth approach very closely to a straight line.”

In order to make practical these suggestions have

different sizes of tin circles, and select, by use of dividers, one whose **radius** is the width of the central, lateral and cuspid teeth of the set you have selected for the case in hand.

BICUSPIDS AND MOLARS, WHAT TO AVOID.

The serious fault with the bicuspid and molars with all makes, until recent improvements in some makes is, first: In nature, the lingual cusps are shorter than the buccal, and the lower longer than the buccal. In many artificial teeth the lingual cusps are the same as the buccal. It is impossible to properly articulate these with lower natural or artificial teeth without grinding the lingual cusp, and there is so little porcelain above the pins it is necessary to grind it all away. The remedy is in teeth with pins set lower, allowing more porcelain and shorter lingual cusps. Another serious fault with many moulds of teeth is in the lack of masticating surface. Some recent makes have remedied these defects, producing satisfactory results.

Very little grinding is done with artificial teeth. The movement is straight down and up. The "three point contact" cuts no figure.

WAXING UP.

Thin, soft rolls of wax applied with the fingers above the necks of the teeth, contouring with the fingers, and always thicker over the cuspid eminence than over the incisors, and bringing down below the

necks of teeth a little, always selecting teeth longer than otherwise needed, so as to have the gum below the curve in the teeth. Holding the case upside down, and with a Haskell spatula held as a pen, with fingers steadied on the left fingers, passing around from left to right, trim the wax, leaving a little fullness over the necks, so that in finishing the vulcanite a festoon of gum may result. On the lingual side, use the curved end of spatula from right to left, straight from necks of the teeth to the plate, leaving no fullness of wax, so tongue shall have all possible room, except back of anterior teeth, where there should be a slope, as the tongue must not meet an angle.

FLASKING, PACKING AND VULCANIZING.

In flasking, endeavor to set the case high enough to have all the wax in the upper flask with the teeth.

To separate the flasks, place in cold water over the heater, and soon as it boils remove and separate, remove the wax and scald by placing flask in the sink and pour the hot water from an elevation.

In packing the vulcanite, a good method to heat the vulcanite is to have a small block of soapstone, heating it just enough to warm the vulcanite. Pack a strip or strips over the pins, cut the pink in $\frac{1}{4}$ inch pieces, and with the Haskell spatula pack between the teeth, then laying over the teeth to top of opening, strips, two or three thicknesses, then packing in the dark material, but careful not to get in

too much, wet a piece of cloth and lay over the vulcanite, place in the hot water to a boil, place in the press and bring flasks together; open, and place more material where needed, heat and press.

Instead of using bolts, use the spring clamp to hold in the vulcanizer. Vulcanize for 50 minutes at 320. If the vulcanite is quite thick use lower temperature and bring up heat slowly.

In finishing, scrapers are not needed, some filing and then a sand-paper chuck in the lathe will do better and quicker work than scraping. With a small carborundum festoon around the necks of the teeth. To finish, cut the felt cones in slices $\frac{1}{4}$ inch thick, and use with pumice, keeping well wet. Finish with small, soft brush and whiting.

ALUMINUM PLATES.

This material requires different treatment from other metals because it is so soft. Use the soft or annealed metal, and gauge 20. If there is some undercut the portion of the counter die which enters the undercut should be cut or scraped away, otherwise there is liability of tearing plate at the margin, but after swaging, tap the plate at this juncture into place with the hammer.

Begin to swage at the tuberosities, but on the palatal surface hold several thicknesses of cloth so the mallet will not mar it. As this metal cannot be soldered, swage without cutting in front, using quick, solid blows, guarding against doubling at the margin. If the plate approximates that condition,

reverse the blow from opposite side. Trim and file as in the gold case, but using a rubber file.

To attach the vulcanite, the safe method is in using the loop punch, eight loops along the margin and eight on the ridge. This can be done after the case is flaked, when ready for packing. Proceed as in the gold case for packing, finishing, etc. A better finish can be produced on this metal by final use of the dry felt.

After finishing, if placed in a solution of caustic soda for a few minutes, a silvery finish results.

Aluminum is too soft for partial work. It will bend out of shape.

PARTIAL SETS ON GOLD.

While the bridge is the thing in most cases of partial dentures, there are cases where a nicely fitting plate with properly adjusted clasps is preferable.

In this class of work plaster impressions are preferable; in fact, the more difficult the case to obtain an impression the greater the need of plaster. Be careful about having too much plaster outside the teeth. All that is really needed are the palatal surface and openings between the teeth.

After removing the model, cut off the teeth, leaving just enough to show, because the case can be moulded and swaged much better. Before cutting off the teeth shape the clasps to the teeth to be clasped. If it is to be a suction plate, place a lead or wax vacuum chamber on the model, the edges to be beveled. Mould as usual and cast.

Cut a pattern of lead as before described, but do not cut out the openings for the teeth, as the plate can be more readily swaged.

Use 20 k. plate, gauge 28. After swaging, cut openings for teeth with plate nippers and file, not allowing the plate to touch the necks of the teeth. Make a pattern $\frac{1}{4}$ inch wide to reinforce the plate. Borax well and place the two together, holding them with three small wire clamps; solder. Try in the mouth and with mirror see that it does not impinge on the neck of any tooth.

If clasps are carefully adjusted little or no harm is done in the wearing of them. The clasp gold is alloyed with a little platinum. It should be 26 gauge, and of an average width of 3-16 inch. They should be adjusted in the mouth, one at a time. The clasp, previously fitted to the plaster tooth, should be tried in, and if all right, spring open slightly and adjusted to the plate with wax (not the hard wax), and tried in, examining with the mirror to see if it is in proper position, and if not, adjusted with an instrument. Then pressing the wax firmly to it, remove and invest. Fine sand is just as good as anything for plate work; equal parts plaster and sand. Warm and remove the wax. The solder should be flowed about 3-16 of an inch, allowing free movement on the tooth. To prevent the solder flowing too far press a little moist investment between plate and clasp, with spatula.

In soldering **plate** work, clasps or teeth, approach from the outside over the top, as the solder can be

handled more readily. After soldering try in to see if the adjustment is perfect; if not, file off and readjust. Two clasps are all that are ever needed.

Take a bite in the modeling compound, and place in the articulator, but arrange teeth always by the mouth. If there are single teeth it is better to use facings, backing and soldering. If mostly posterior teeth, use vulcanite teeth, soldering loops for attachment to the plate.

In case a porcelain gum is needed an unfortunate condition has arisen. The universal adoption of bridge-work has resulted in little call for gum teeth, either for plate-work or vulcanite, so the manufacturers have largely ceased making them. Of course, in case the gums are not seen, vulcanite is all right.

THE VULCANITE PLATE.

This is so universally used and instruction given in it in the schools, that it does not seem necessary to go into details. There are some suggestions, however, that may be made in methods.

For instance, in flasking, to set the case if possible high enough so the wax will be in the same half of the flask as the teeth.

To separate the flasks, place in a pan of cold water, over a heater, and when it boils, remove, as it will be warm enough to separate, and not melt. Scald out balance by pouring water from a height.

Instead of cutting the usual gates scrape a little plaster from the surface all around, and then a groove all around. In this case it will be possible

to close the flasks without trying to squeeze out the vulcanite held between the plaster surfaces.

The relief for a rubber plate can be made by scraping the impression or the plate in finishing.

After packing the rubber cover the model with tin foil, rubbed to place with a cloth.

PARTIAL LOWER PLATES.

As a rule vulcanite answers every purpose on the lower jaw, as it makes no difference what is worn on it as the ridge disappears in spite of anything that is done for it.

The partial lower plate should extend well up back of the anterior teeth, but not to press against the teeth, nor between the teeth so as to irritate the gums as the plate may settle.

The best clasp for these cases is made of gold wire, 18k, 18 gauge, one and a half inches long, bent double, not close together. Fit to labial and side of the tooth, and the ends bent at right angles, to vulcanize into the plate.

A new method of constructing these plates is to avoid placing the rubber in contact with the teeth by using a bar of gold, or iridio-platinum, connecting the ridge plates. The bar to be soldered to German silver plate about one-half inch long and one-quarter inch wide, to be imbedded in the rubber. Band clasps to be soldered to the wire. The bar to be set below the margin of the gums.

Gold plates may be swaged to the ridges each side, and loops for attachment of rubber. The wir-

ing of lower plates is not desirable as they so often have to be filed for relief from irritation.

REPAIRING VULCANITE.

No holes, dovetails, nor solutions are needed. In case of a broken plate, fill plaster into it, remove and break entirely in two. With small carborundum grind along each side of fracture, one quarter-inch wide, a depression, and very thin at the edges. Cut vulcanite in quarter-inch pieces, and with hot spatula pack on to the surface, filling up to proper fullness, flask and vulcanize.

In case of replacement of one or more teeth, grind out remains and fit new tooth in place, invest so as to hold the teeth, remove wax, and with hot spatula press the vulcanite to the plate and flask and vulcanize.

ADJUSTMENT IN THE MOUTH.

After the work is completed, be careful to adjust it in the mouth so as to leave as favorable an impression as possible.

If it is a clasp plate, see that the clasps spring into place so as to hold, and yet not be injuriously tight. See that the teeth are articulated in partial sets, so that the pressure is thrown on the natural organs, excepting the anterior.

In adjusting a full set the greatest care must be taken to see that the articulation is correct. Say to the patient: If you find the plate hurts you, call soon and have the pressure relieved, for it is not

necessary to suffer; relief should be afforded at once, as one cannot masticate otherwise.

It is advisable to see the patient in a few days, to be sure that the articulation is correct. Too much stress cannot be laid on this point.

Thick articulating paper is very useful to indicate where grinding is necessary. The ordinary black transfer paper will answer, although rather thin, but the thick imported paper is best.

If there seems to be undue pressure at any spot on the hard palate, it may be located upon the plate by spreading a little moistened whiting upon it and pressing the plate into place.

There are mouths where all the conditions are favorable, so that it is easy to secure results satisfactory to the patient as well as to yourself. There are mouths where **all** the conditions are unfavorable, and after the dentist has done all that care, skill, and experience can accomplish, the patient will complain, and wonder why the teeth do not work as satisfactorily as Neighbor Blank's. It is often because the conditions of the mouth are entirely different or unfavorable to the best results. The only thing is to impress the importance of patience and constant use of the teeth. Time and perseverance will accomplish wonders.

A few hints may be given on the use of artificial teeth, as, for instance, in biting an apple; if the teeth are used as the natural teeth are, they are liable to be thrown down from behind. The new teeth must be pressed **against** in biting. In mas-

ticating, if the food is all placed on one side, the leverage is such that the plate is possibly displaced; and yet, in time, the patient will learn to eat on one side; but at first divide, and with the tongue place the food on both sides.

LOWER FULL DENTURES.

The lower jaw is the problem of the dentist. By this I mean in the case of the great number of lower jaws where absorption has progressed until no ridge is left—a flat, narrow surface, often a movable, sensitive membrane. A plate constructed for such a jaw, I care not what the impression is, may not prove at once comfortable, when pressure is brought to bear upon it. There will be irritation at various points that must be relieved, for it is impossible to masticate otherwise. In such cases it will be weeks before perfect comfort and usefulness is acquired.

I say that no dentist who has not had my personal experience in his own mouth has any idea of what patients often have to contend with, and too much effort cannot be spared to inform the patient of what they may have to experience and to impress upon them the necessity of going to the dentist for relief at once in case of irritation.

Why there should be such excessive absorption of the lower jaw I never have been able to understand. It proceeds regardless of what material is worn upon it, in fact when no plate has been worn after the loss of the posterior teeth,

In these cases there needs to be restoration where the process is lost in order to restore the contour of the lips. This makes a long bite, which necessarily increases leverage in mastication, making the plate more difficult to use for a time.

In this class of cases it must be borne in mind that although there may be some depression on the lingual side of the jaw, the plate cannot be worn below the margin at all, because it will be lifted not only by the muscles, but by a mass of glands and loose membrane. Even holding the end of my finger firmly a very little over the margin, upon lifting the tongue the finger is displaced.

It is just here that many patients are enduring unnecessary annoyance because the dentist has thoughtlessly extended the plate below the margin.

For many years I recommended the use of cast metal plates. The second plate I made for myself was one of them. After having them in for a short time I went into the laboratory and leaned forward to speak to a student and the denture slid forward, because on this flat jaw there was nothing to resist the weight. That night, when lying down, it slid into the cheek, so I had no further use for it.

Of course, if there is a ridge to straddle that trouble would not occur, but my experience has fully demonstrated to me that a vulcanite plate is just as good upon any lower jaw as anything that is worn, and that weight is not a necessity in any case.

I have found that a flange on each side is an ad-

vantage in that the cheeks help hold the plate down and keep it from moving forward.

In relieving the irritated spot, although it is readily seen, it is not always easy to locate it on the plate. Take a little moist whiting on a spatula and touch the spot, and upon replacing the plate it is readily seen, on the plate.

Where the posterior teeth have long been removed and a plate worn and later on the anterior teeth are removed and a full plate worn, as the anterior gums settle and the bite shortens in front, the posterior teeth do not shorten, and under pressure there results irritation at the heel. The remedy is found in shortening the molars and not in filing the plate.

Unfortunately suitable impression trays for ridgeless jaws are not provided. Cut away the flanges from the tray. An impression in modeling compound, then in plaster, is best. Vulcanize the plate, then secure the bite and arrange the teeth.

CONTINUOUS GUM DENTURES.

After nearly sixty years' use, the Continuous Gum Denture remains the only ideal denture made. When properly made it is the most durable. It is the most artistic and natural in appearance, and the only absolutely clean work, as there is no possible chance for secretions.

The strength of this work is in the metal foundations. If proper care is taken here there is little danger of breakage.

Use 28 gauge platinum. Process of dies and swaging the same as in all other metals.

Across the heel, extending over the tuberosities, solder a "doubler" one-quarter inch wide, gauge 30, cut from lead pattern. This is more easily adjusted if cut in two, with one end a trifle longer, so as to lap in the center. Swage, not on the plate, then with plate on the die burnish closely to shape of plate, trim, and around the tuberosities slightly curved. With flat, wide-nosed pliers turn up the inner margin very little, and again burnish. Apply a little borax to direct flow of solder and clamp at two points near the center, using pure gold for solder, cut in small pieces, laying one piece in the center and solder; remove the clamps, burnish again, apply clamps near top of tuberosities, and finish soldering to the top; again burnishing over the outside, clamp and finish soldering.

For wiring use 18 gauge wire, rolled flat to 22 gauge, to be applied edgewise. As the edges are round file one square and fit that to the right side, clamp and proceed as described in wiring gold plate, fitting the ends to the curve of the doubler, connecting with the upturned margin. File to a finish.

Teeth are made expressly for this work. The long roots, if too long, can be clipped off with cutting pliers and ground just to touch the plate. I have a preference for the Justi teeth.

The investment should be plaster and short, coarse asbestos, equal parts. As there is to be

some pressure applied in adjusting the backings, and the investment might yield some, apply first a very thin coating of clear plaster. When hard apply heat underneath to warm the wax, so as to remove bodily; then scald out.

I am not in favor of soldering an iridio-platinum wire to the plate, having never found it necessary in my fifty-six years' experience in this work. Instead, I form a backing in three sections, lapping over the cuspids. The backing has a footpiece $\frac{1}{8}$ inch wide under which the gold, rolled very thin, is placed in pieces 3-16 inch square and the pins pressed down over the backing and a small piece of gold under each. A pattern of tea-lead is made for each piece, fitting with spatula. The backings are easily fitted in place with a worn-out, small vulcanite scraper. Heat up gradually, as hot as possible over the gas heater, then solder, not only flowing the solder but give extra heat so the gold will be absorbed by the platina, as porcelain will not adhere to gold, besides a liability to blister in the porcelain. When cool, clean thoroughly. Try on the model, or die, to see if the plate is changed at all, which is a very rare thing.

I have always used Close's material. For mixing, the small, shallow dishes, found among artists' materials, are the best; a small dish of water back of the material. A Haskell spatula, small camel's hair brush; small, stiff brush, quill toothpick, and piece of old linen napkin for absorbing moisture.

Beginning at the posterior right hand corner,



holding the case upside down, apply the material, mixed thin, between and under the necks of teeth, filling all crevices, jarring when filled all around, and absorbing. Absorb excess of moisture from the dish, and apply thick, beginning at the center. Jar and absorb, perhaps twice, then pack hard, especially between the teeth. Continue to apply until built up to proper thickness, thin over the incisors, but two or three times as thick over the cuspids at margin of the plate. Jar, absorb, partially dry over the burner, then with quill toothpick, beginning at the right side, holding the plate upside down, trim around the necks of the teeth and also between. This is more easily done with the toothpick than with a steel instrument. Contour around the necks, brush off the chips, and with the camel's hair brush wet and pass deftly around the necks of the teeth. Be sure to remove all particles from between the teeth.

Using the curved end of spatula, holding the case, anterior teeth towards you, beginning at the left heel apply around necks of the teeth, packing hard; then over the palatal surface, thin; jar and absorb, partially dry and pack hard, filling in more and finally contouring the necks to resemble nature and not leave the gum at a square shoulder, as in vulcanite. Brush off from teeth and plate all particles, dry and place in the oven. Bring up the heat gradually, occupying 15 to 20 minutes. Fuse to a glaze, not a gloss, for first bake. Remove and place in some covered receptacle. I use an old oil furnace muffle.

It is not necessary to have the muffle warm. No danger of checking. Handle the case with a pair of pliers about six inches long, grasping it firmly at the rear and right over the porcelain; not necessary to handle on the slide. Shut off the current before removing the work.

When cool, wet thoroughly, and apply the material very thin and jar into all crevices; then applying thicker to replace the shrinkage, going all over the case as at first, form the rouga, simulating nature. Dry and place in the oven, and as before bring up the heat gradually and bake to a **gloss**, being careful not to overbake. These cases cannot be timed, as crowns and inlays, but the eye must determine the fuse, and it can be done only by opening the oven and perhaps removing to examine.

When cool, apply the enamel, after thoroughly wetting the case, at first between the teeth, then evenly, about 1-32 inch thick, handling not so wet as to flow, nor too dry. A little practice is needed; spread evenly. Apply the wet brush deftly around the necks of the teeth and between. Remove all particles from between the teeth, by wetting and blowing. Apply thin to the lingual surface. Dry, brush off particles and place in the oven. Take a little time at the start to bring up the heat. Bake to a gloss. When cool, file the wire to a flush finish over the porcelain. Pass a small carborundum over the doubler. Finish with small felts and pumice, and finally soft brush and whiting.

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REPAIRING.

In order to prevent the checking of teeth and gums, first invest the case in plaster and asbestos, one-half inch thick, all over and under. Place over a heater and apply the heat gradually until hot as a large blaze will make it, taking one and a half hours. When cool remove the investment and clean. If only a corner of a tooth is broken off slightly build up with Brewster porcelain. If it is necessary to replace the tooth, grind out, not only the tooth, but some of the gum. Select a vulcanite tooth, grind it in, holding with wax, and apply a little investment of plaster and asbestos over the tooth and the adjoining teeth; scald out the wax and apply a repair material, easy fusing, Close's. Heat up gradually and do not fuse fully. If the gums are cracked, grind a crevice into the fracture. Apply some body. When cool, remove all trace of the investment, and apply enamel and bake fully. It is not necessary in any case to attempt to solder in repair cases.

Should there be some roughness on the bicuspid and molars, sandpaper and apply a little very easy fusing porcelain, Jenkins', for instance.

After adjusting this work in the mouth, caution the patient not to wash it over a basin but to fold a towel on the stand and wash it over that.

SEVEN ABNORMAL CONDITIONS ON THE LEFT SIDE OF THE MOUTH.

The first peculiarity, and which I have called attention to for twenty-five years, is a depression over the left cuspid eminence. This occurs in 95 per cent of jaws. This of course requires more filling out of the artificial gums, in order to restore the contour.

The second peculiarity is found in the gum being higher, or absorbed more on the left anterior margin. This necessitates the teeth being dropped below the margin.

The third peculiarity is found in the tuberosity on the left side dropping lower than on the right, so much so sometimes there is not room for a second molar. This occurs in 97 per cent. of jaws.

The fourth peculiarity is seen on the lower jaw, where the anterior teeth are higher and more prominent than on the right side. So it is sometimes difficult to avoid interference of the upper teeth.

The fifth is found in the divergence of the left side of the jaw farther from the median line than the right, necessitating setting the teeth farther over ridge for symmetry.

The sixth is found in more absorption or depression usually than on the right.

The seventh is the raising of the lip higher on the left side in very many mouths, so that the teeth appear longest on that side in arranging artificial teeth, as the lip rises.

ABNORMAL CONDITIONS OF THE PALATE.

The palate is in a normal condition in 97 per cent of mouths requiring the "relief."

In about three per cent of cases, the palate is soft, usually a crevice is seen. In these cases no "relief" nor vacuum cavity is needed, simply fit the plate snugly to the whole surface.

In some jaws there is an abnormal growth of bone, varying greatly, occasionally covering most of the center of palate.

These require the "relief" more than other conditions, as irritation otherwise results. Cover entire surface down to the base with relief. These cases are not difficult to make.

The occasional V-shaped palate, quite a deep groove, is usually troublesome to handle for adhesion. No relief nor vacuum.

INJURIOUS EFFECTS OF VULCANITE.

Patients should be informed of the objectionable features of vulcanite, for a young or middle-aged person who has to wear an artificial denture the remainder of their life should aim to have the jaws remain in as perfect a condition as possible.

Among the objectionable features in the use of vulcanized rubber in the mouth, one of the most objectionable is the least referred to, namely, the **constant absorption of bony structure** resulting from heat-retaining quality.

It cannot be that this effect is overlooked by den-

tists generally. Can it be that it is ignored for prudential reasons? Doubtless a majority of those who commenced practice since the introduction of rubber are not sufficiently familiar with the use of metal plates to have noticed the difference in their effects. Nevertheless it is true that **vulcanized rubber** and **celluloid** too are producing incalculable injury to the mouths of many of those who wear them.

Sixty-three years' experience, exclusively in mechanical dentistry, has given me ample opportunity to satisfy myself as to the correctness of this statement. The case is plain and can be readily understood by the patient, and instead of universal recommendation of this material for permanent work, a statement of its nature should be made so that the patient can have a choice in the matter, and not be led to think that it is not only a good material, but really the best for artificial dentures.

These vegetable bases are **non conductors of heat**, and it is to the undue retention of heat in the mucous membrane, combined with pressure, that the absorbents are unduly stimulated, resulting in a constant loss of bony tissue. Now for the proof of this assertion, I have rarely seen a mouth where a rubber plate had been worn five years and upward but there was manifestly an undue absorption of bone tissue in the upper jaw often to such an extent that there is nothing left but a flabby ridge.

Sometimes there is undue absorption when wearing metal plates, but those are the **exceptions**, and

not the **rule** as in the other case, and arising generally from undue pressure, long continued at one point, or to some peculiar idiosyncrasy or constitutional taint.

This fact was emphasized in my own mind more fully upon a visit to Boston, where I saw various mouths wearing plates of gold and continuous-gum, which I made fifteen to twenty-four years previously. In every instance, lower as well as upper, the gums showed little additional absorption, and were hard and healthy. I am constantly investigating mouths for the purpose of witnessing the relative effects of rubber and metal plates, and am more and more impressed with the great injury being done to the gums from this cause. And it is really a serious matter to the individuals who are doomed to wear artificial teeth the rest of their lives, for they cannot fail to appreciate the fact that the better and more permanent the condition of the gums, the better will they be enabled to successfully and comfortably use their teeth.

In addition to this, the use of the **red** rubber, the coloring matter of which is **bi-sulphuret of mercury**, to those who are peculiarly susceptible to the effects of mercury in any form, produces still worse results, affecting not alone the mouth, but the stomach and entire intestinal canal, resulting in some cases in diarrhœa. The following cases illustrate what I have stated:

A lady residing in Topeka had for twelve years worn a red rubber plate. She suffered constantly

from sore mouth, and finally severe stomach troubles and chronic diarrhœa, which her physician failed to relieve. She came to consult me. I told her the plate was the cause, and substituted a continuous gum denture. She returned home. In six weeks she accidentally broke off a tooth and sent to me for repairs. The plate was out of her mouth for a week, and in the meantime she wore her rubber plate. The next summer she was in Chicago, and told me her experience. After wearing her new set, till she broke them, her long-standing symptoms disappeared. Upon putting in the old set and wearing a week only, they reappeared, but again disappeared on getting the new set back again. She related her experience to her physician; he said he did not know she was wearing a rubber plate, and if he had, did not know there was any harm in it, but said he had been treating her for symptoms of **mercurial poisoning**, and could not imagine why he had failed to secure satisfactory results.

Mrs. B., residing in Wisconsin, had been wearing rubber plates for several years. Sore mouth, stomach trouble, and chronic diarrhœa, to the extent of eight to twenty operations of the bowels daily, and from which she could obtain no relief. At last her attention was called to the injurious effects of rubber plates. She came to Chicago and had **metal** plates substituted, and her troubles vanished as if by magic. A sister had the same experience.

A lady in Racine, after wearing a rubber plate several years, found her health seriously impaired,

severe stomach troubles, a fearfully sore mouth, the sores extending to the outside, and latterly her throat in such condition that she could swallow only soft food. She consulted physicians. They told her the condition of her mouth and throat resulted from the condition of her stomach. The dentists did not know what to say, only that it **was possible** it was the result of wearing the red rubber plate, but did not advise, as they only used rubber in their practice. At length a recent graduate of a dental college, who had already investigated the subject, was consulted. He told her at once the cause, and advised her to leave out the plate, except while eating, for two weeks. The trouble disappeared, and he then made a black rubber plate with no further throat trouble.

These are only a few instances of the effects of the coloring of the **red** rubber.

SOME CASES: WHAT TO DO WITH THEM.

Case No. 1.

In the upper jaw excessive absorption has taken place, leaving small surface for the plate.

On the lower jaw the anterior teeth and bicuspid remain, but these latter have been pressed out so far they are entirely outside the upper jaw. In fact, the ten teeth are nearly on a line but very little curve.

The bicuspid on the right side form an inclined plane laterally, always an unfortunate complication.

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The entire closure is outside the upper jaw. Here is a constant strain on the upper set.

The molars should be replaced on the lower jaw for masticating purpose. As there must be a plate, the patient will be far better off with the bicuspid removed and placed on the plate, because, as they are, the upper bicuspid have to be set so far in they barely catch on to the lower ones and are practically useless.

With a "bar" plate and nicely adjusted clasps, the patient is in better shape for masticating, the mouth looks better, and undue strain on the upper denture is relieved. The patient can never have satisfactory results until this is done. This represents but a small class of cases.

Do not hesitate to extract teeth if thereby **better results are attained.**

Case No. 2.

All the anterior teeth, and on the **right** side the posterior teeth are sound and solid.

On the lower jaw all the anterior teeth, and on the **left** side the posterior teeth are in place. Here is a very unfortunate complication, as can readily be seen.

On the upper jaw the extraction of a bicuspid and clasping and tooth with it, secures a hold to counterbalance pressure on the left side. No vacuum cavity would hold.

On the lower jaw a bar plate and clasp to some tooth on opposite side by separating, if no space is there.

Good service could in no other way be attained, as a plate hung to a tooth at the open space would be insecure.

This is a case where the anterior teeth remain and should be in contact.

WHAT MAY THE PATIENT REASONABLY EXPECT OF ARTIFICIAL TEETH?

Says Mrs. A, "There is Mrs. B, has a set of teeth that she can do anything with, and she never has the least trouble with them; why can't I have the same success with mine?"

Simply because you have not Mrs. B's mouth! There is just as much difference in the shape and condition of mouths as in the face. There is the flat and the deep palate, the hard and the soft palate, the broad and the narrow ridge. The relative position of the two jaws has much to do with the usefulness of artificial teeth, especially if a portion of the natural teeth are remaining.

Lower sets are more troublesome than upper, and the mucous membrane of the lower jaw is apt to be more sensitive, especially when the ridge is very thin, or where it has nearly disappeared from undue absorption of the bone.

In partial sets, plates with only **front** teeth, are always more difficult to use than those with side teeth, unless in case clasps are worn.

But always bear in mind it does not follow that because your neighbor's teeth are a complete suc-

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cess in all respects, yours must necessarily be equally so. In your case in consequence of unfavorable conditions more time and patience may be required to become accustomed to them.

Where the patients say they "forget they have artificial teeth," they are the exceptions to the general rule.

There are no cases, however, where a set, or part of a set of artificial teeth may not be worn with comfort and a good degree of usefulness.

"THE DON'T FORGETS."

Applied to Plate Work.

Don't forget:

1. That plaster is always a reliable impression material.
2. That the more difficult the case to obtain an impression, the more necessary the plaster.
3. That the only portion of the upper jaw which never changes is the hard palate.
4. That unless provision is made for the settling of the alveolar ridge, it is only a question of time when the plate is resting and rocking on the palatal surface.
5. That the vacuum cavity is seldom needed to retain the plate, and, also, if used, the plate is sooner or later rocking.

6. That the remedy, in a metal plate, is the covering of the entire hard surface with a thin film of wax (the "relief"). In a vulcanite plate, scraping the impression.

7. That there is no necessity nor advantage in scraping the soft portions of the model in any case.

8. That vulcanite should not be used for permanent upper dentures, because of increased absorption in 80 per cent of mouths on account of retention of undue heat.

9. That the great number of cases of excessive absorption of the anterior portion of the upper jaw and soft ridge arises from this cause, but is greatly enhanced by undue pressure of the anterior teeth.

10. That the anterior teeth in full upper dentures should **never, never**, under any conditions, come in contact for the above reason, and also because the plate is displaced every time the jaws meet.

11. That the fitting of a metal plate is as easy as of a vulcanite, and in flat, ridgeless jaws better success is assured.

12. That a proper Babbitt metal die insures better success than zinc, because it has all of the five necessary qualities for a dental die; viz., non-shrinkage, will not batter, will not break, is smooth and melts at a low temperature.

13. That the melting temperature of the lead for counter-die must be reduced by the addition of tin, one part, to five of lead, and not poured as hot as it comes from the heater, but stirred until it begins to crystallize.

14. That aluminum makes an excellent substitute for vulcanite.

15. That in the question of the extraction of certain teeth, the only thing to be considered is what shall be done to make the artificial denture the most useful and comfortable.

16. That the retention of the cuspid teeth is unwise from every point of view, weakening the denture; the latter is not so easily retained, nor as useful.

17. That there is no necessity for retaining them, because they are practically useless, and the change in the features caused by their extraction is remedied by making the plate higher at those points and the artificial gum fullest.

18. That there are more failures from faulty occlusion than from any other cause.

19. That correct occlusion can better be secured by the use of the thick articulation paper than by any other means.

20. That in arranging the lower to an upper set, begin with the second bicuspids; then the first,



so as to secure correct interlocking of the cusps, for in nearly all full sets, of all makes, the anterior lower teeth are too wide for the uppers, and must be changed so as to come within their proper limits.

21. That in taking the "bite," if the tongue is turned back as far as possible the jaw cannot be moved forward.

22. That teeth should always be arranged by the mouth, as it is only there one can determine when they are correct, and also the patient should see them, so if any change is desired it can be made prior to completion.

23. That the numerous cases of flat, narrow, ridgeless lower jaws are the problem of the dentist.

24. That when the tongue is raised the glands and loose integuments rise above and drop over the margin of the jaw.

25. That in such cases, no matter what depth there is on the lingual side of the jaw, the plate should not be extended below the point where it is lifted, as it is constantly lifted to the great annoyance of the wearer.

26. That a very common fault with artificial teeth in many mouths is they are too short, no attempt being made to restore the features.

27. That small, white or colorless teeth are too often used, and resemble a row of beans.

28. That the serious fault with all makes of teeth is found in the bicuspid and molars. The lingual cusps should be shorter than the buccal in the upper teeth, and as they are not, it is impossible to bring the buccal cusp into proper alignment without much grinding of the lingual.

29. That the pins, even in long teeth, are too near the cusp when it has to be ground nearly all away, whereas the pins should be lowered, allowing more porcelain and, also, shorter lingual cusps.

30. That too many bicuspid and molars are so narrow and thin there is little surface for mastication.

31. That the continuous-gum denture remains, after nearly fifty-eight years, the only ideal artificial denture in all respects.

32. That the prominent upper jaw and short lip absolutely require this work to fulfill all the requirements of the case.

33. That nothing else in prosthesis gives such scope for artistic work, and yet much of it is a disgrace to the maker.

34. That there are seven distinct peculiarities of the left side of the mouth, seldom seen on the right, all of which have to do with the arrangement of the teeth and contouring of the gums.

35. In full upper dentures there must always be

equal pressure both side, on the bicuspid and first molars.

36. There cannot be equal pressure if there are no natural teeth on one side of the lower jaw and one, or even two, bicuspid on the other side, for the artificial teeth placed on the vacant side will sooner or later settle, and pressure revert to the anterior teeth (which should never be) and the bicuspid.

37. The proper and only thing to do is to extract the bicuspid and so have equal pressure. When they settle remove and raise higher.

CAST METAL PLATES.

It may be asked why I have not referred to Cast Metal Plates, especially Aluminum.

I do not consider them of especial value, and have found in all cases I tried them better success with the swaged plates.

BIOGRAPHICAL SKETCH.

The author of this work was born in Bangor, Maine, in 1826. His father died when the child was but five years of age. The mother married again and moved to Salem, Mass., where he attended school until 15 years of age when he went to Boston and became an apprentice in a printing office, remaining until 19, when a brother-in-law urged him to take up dentistry, which he did.

The dental practice of those days offered few advantages as compared with the present day. There was one dental college, the Baltimore, but dentists considered that a student would become more proficient in the office of a good dentist than in the dental college. No doubt it was true then.

There was but one dental journal and that seldom seen. There were no dental societies. Dental offices were close corporations, for unless one was an intimate friend he was not allowed to visit the operating room or laboratory of other dentists of repute.

The student had to familiarize himself with melting and refining gold for plates, and making solders.

All teeth were on plates, except occasionally a pivot tooth on a wooden pivot. All work was soldered, and with a mouth blow-pipe, and often an alcohol lamp. This involved full sets of single gum teeth.

The tools and appliances were crude as compared with modern times. Grinding was done with emery wheels.

Plaster for impressions was just introduced and that, too, the common plaster.

The writer was employed very largely for his first eleven years in manufacturing the teeth used, carved in sections, for each case. Preparing from the crude material, feldspar and quartz, grinding fine, mixing in certain proportions, adding coloring materials, etc.

The teeth were biscuited, trimmed, pins inserted, enameled and baked. Then ground to the plate, rimmed, backed and soldered.

In 1851 a license for the construction of Continuous Gum Work was purchased of John Allen, a system he has used ever since.

Removed West in 1856, to Milwaukee and in 1857 to Chicago, and for eleven years was associated with Dr. Allport.

At the inauguration of the Chicago Dental College he became a member of the faculty for four years. Later was a member of the faculty of the Northwestern Dental College.

In 1889 he established the first Post Graduate School of Dentistry and in connection with it the first laboratory for outside dental work.

In 1898-99-1900, made trips to Europe and instructed post graduate schools in Berlin, Hamburg, Vienna and Paris. At the cities was invited to address dental societies in all of them.

He has been a contributor to the various dental journals for more than forty years.

The writer is in perfect health and in active practice, and is glad to be of service to the young members of the profession.

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